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**FIVE YEARS AFTER THE METRIC  
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WHERE DO WE STAND?**

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**SURVEY OF LARGE U.S. MANUFACTURING  
AND MINING FIRMS  
(The FORTUNE Magazine 1000)  
EXECUTIVE SUMMARY**

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) A mail survey of randomly chosen 202 of the 1000 largest manufacturing and mining firms, as listed by <u>Fortune</u> magazine, was conducted in late 1979 and early 1980. About 64 percent (112 firms) responded with useful data. This Executive Summary draws on the full report (U.S. Metric Board 1979 Survey of <u>Selected Large U.S. Firms and Industries</u> , Lisa King, King Research, Inc., May 1980; AD-A-091-618) and provides an overview of the study's findings. Some selected findings are:		

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- o About 30 percent of the large firms produce at least one hard metric product;
- o About 48 percent of foreign sales are of metric products;
- o Little corporate coordination and planning seems to accompany conversion to the metric system;
- o About one-third of the firms see laws and regulations as impeding conversion;
- o Over 50 percent see lack of customers demand as inhibiting conversion;
- o The most realistic time period for conversion is 10 years, the minimum time for conversion (under pressure) is three years, and the preferred time (at the firm's own pace) is eight years.

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**SURVEY OF LARGE U.S. MANUFACTURING  
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**U.S. Metric Board  
1600 Wilson Boulevard  
Arlington, Virginia 22209**

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## **FIVE YEARS AFTER THE METRIC CONVERSION ACT, WHERE DO WE STAND?**

### *History of Metrication in the U.S.*

The United States is the only major industrial nation that does not formally use a metric system of measurement as the primary system. Prior to World War II, over one-half of the world's nations employed metric measures. Then, most of the remaining nations followed, with Japan and Great Britain the last large industrial nations which have converted entirely or committed themselves to a metric system. (See Figure 1.)

Use of metric measures has been authorized in America since 1866. Through the Treaty of the Meter (late 1800s), the U.S. declared the new metric standards to be the Nation's "fundamental standards." Yet, the topic of metric usage and particularly the principle of a national policy requiring the use of metric measurement units have continued to be controversial. In 1968, the U.S. Congress authorized a study of the metric system and its role in the U.S.<sup>1</sup> The report of that study, published in 1971, states that, since the nation is already "drifting to metric with no national plan to help the sectors of our society and guide our relationships abroad, a carefully planned transition in which all sectors participate voluntarily is preferable."

Partially as a result of the National Bureau of Standards study and a spirit of compromise and sensitivity, coupled with considerable debate and discussion, the U.S. Congress enacted and President Ford signed into law the Metric Conversion Act of 1975. The principal operative concept of the Act is its focus and emphasis on a process of voluntary conversion to and voluntary use of the metric system. No timetable is established by the Act, nor is there the implication of a national policy supporting conversion. The Act does, however, establish a national policy of coordinating and assisting in the planning for the voluntary use of the metric system.

The U.S. Metric Board, established by the Metric Conversion Act of 1975, is directed by the Congress to coordinate voluntary conversion activities in the United States. Since one of its charges is to collect, analyze and publish information about the extent to which metric measurements are used throughout U.S. society, the Board initiated a survey of large

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<sup>1</sup> Report to Congress, *A Metric America, A Decision Whose Time has Come*, National Bureau of Standards, U.S. Department of Commerce, July 1971, Special Publication 345.

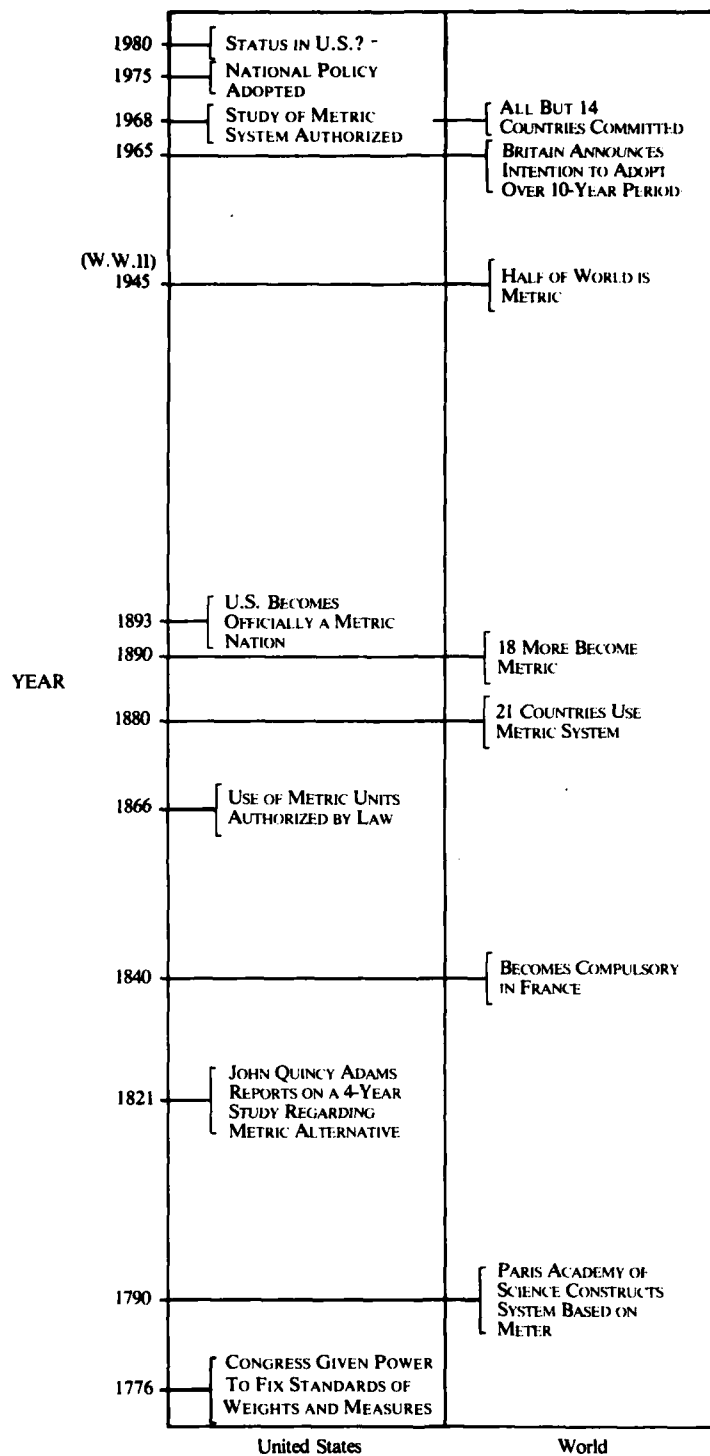


Figure 1. Status of Metrication Over the Years Worldwide and in the United States

businesses which was finished in early 1980. This survey<sup>2</sup> determined the status and intentions of the largest U.S. manufacturing and mining firms, designated as the Fortune 1000.<sup>3</sup> Two hundred and two firms were selected through a probability sampling process to be representative of the Fortune 1000. Of the 202 surveyed, 130 (64%) responded with useful data. Not all questions were answered by all 130 respondents; thus, the basis for each issue discussed below varies somewhat. However, throughout the analysis, the basis is adequate. The overall response rate is good for a survey of this type. This response rate coupled with the probability sampling procedure support inferences derived from the sample data and applied to the population of the Fortune 1000 firms.

The survey covered a range of topics, including the number of companies producing metric products and providing metric services, the proportion of total sales (foreign and domestic) that are of metric products, the extent of planning underway for the use of the metric system in industry, inhibitions affecting metrication, and expectations for the future. This summary provides an overview of the survey results; more complete information is available from the U.S. Metric Board.<sup>2</sup>

The summary contains discussions of three forms of metric products: "hard," referring to products that are designed and/or manufactured using metric dimensions; "soft," referring to products that are designed and/or manufactured using customary dimensions but for which the metric equivalents are provided (soft metric is also called "dual labeling"); and "hybrid," referring to products that use combinations of metric and customary parts or components. The phrase "metric product" is reserved in this summary for unspecified products that are either soft, hard, hybrid, or a combination of any two or all three.

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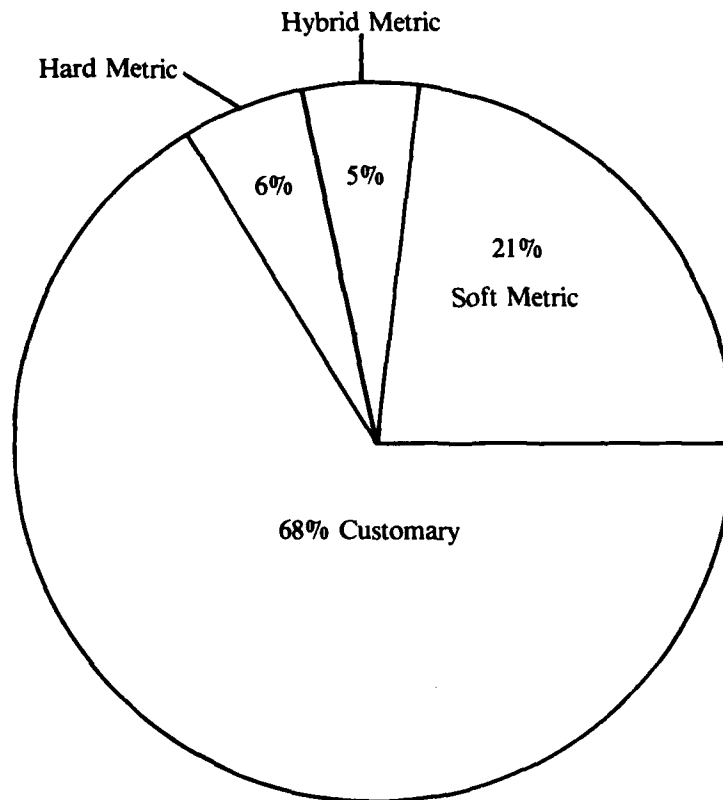
<sup>2</sup> U.S. Metric Board 1979 Survey of Selected Large U.S. Firms and Industries, King Research, Inc., Rockville, Maryland, May 1980, Report number AD-A-091-618.

<sup>3</sup> Fortune, Vol. 99, No. 9, May 7, 1979 and Fortune, Vol. 99, No. 10, June 18, 1979.



### ***The Level of Metric Conversion Varies Widely***

In terms of sales, products displaying metric equivalents (soft metric) are the most common, far outweighing the sale of products manufactured in metric units only (hard metric) or in a combination of metric and customary units (hybrid metric)\*. (See Figure 2.)



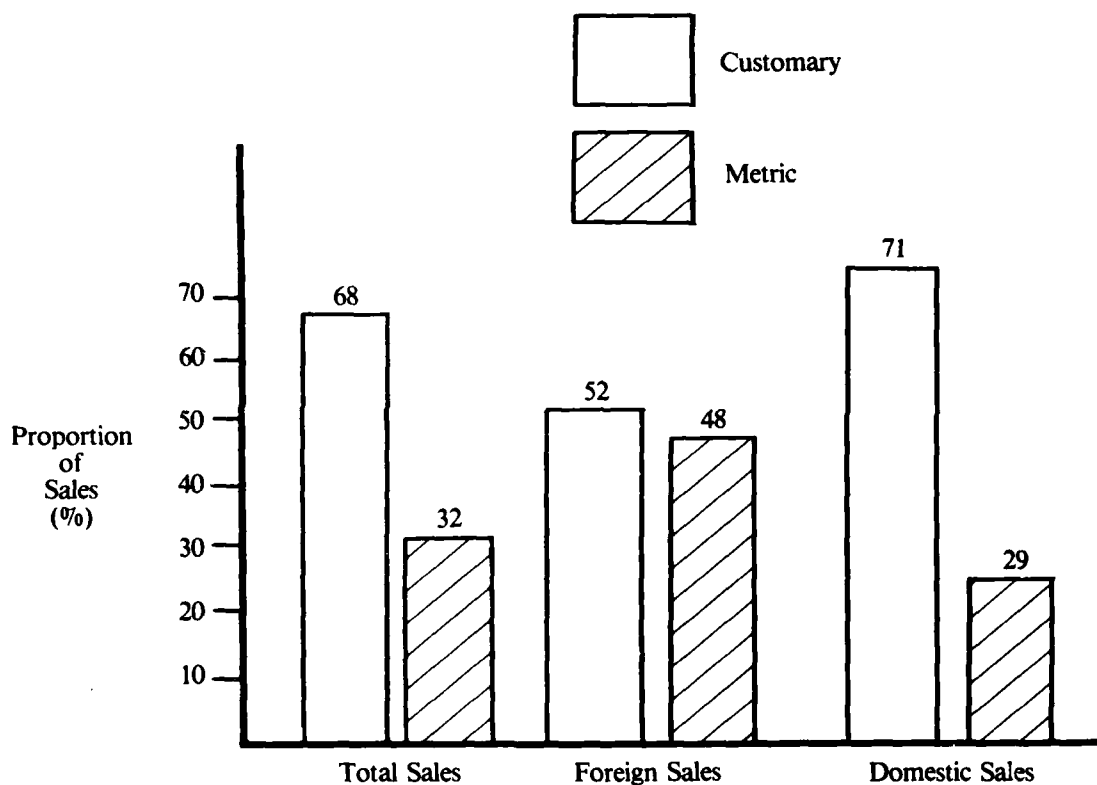
**Figure 2. Proportion of Total Sales**

Of the firms that produce at least one metric product (estimated to be 62 percent of all large firms), almost one-half indicate that at least some of their products are designed and/or manufactured as hard metric. A larger proportion of these firms, nearly three-fourths, provide soft metric products. About one-fourth of the firms producing at least one metric product provide hybrid products. Since firms can produce soft, hard, hybrid, or any mix of products, the percentages overlap.

\* There is clearly a difference in effort, decision processes, and costs between soft and hard conversion. This matter should be kept in mind in interpreting the results of this study.

### ***Metrication Activity Among Large Manufacturers***

The sale of metric products accounts for 32 percent of the total net sales of the firms' products. (See Figure 3.) Manufacturing companies seem to have found that metrication is important in order to compete in foreign markets since 48 percent of their exported sales involve metric products, compared to 29 percent of domestic sales. The first 500 firms have converted somewhat more extensively to metric than have the second 500. For the largest 500 firms, one-third of sales involve metric products, compared to 24 percent of sales for the second 500 firms.



**Figure 3. Comparison of Sales of Customary and Metric Products**

### ***Planning and Coordination Begins, But at a Low Level***

Over half of the companies have begun planning or coordination for metrication in the form of at least one metric related activity such as:

- corporate planning (e.g., issuing a metric policy, appointing a metric coordinator)
- coordination with industry and government (e.g., cooperative planning)
- operational activities (e.g., training employees)

The number of companies involved in individual planning and coordinating activities is limited. About one-third of the firms have begun coordinating metrication with others in their industry (36%), appointed a metric coordinator (35%), or are conducting R&D activities in metric language (33%). At the other extreme, the least often mentioned activity (of the set of 18 activities chosen for investigation) was budget funds for metric activities (11%).

The data suggest that corporate metric planning and coordination activities have not changed much over the past few years. The U.S. General Accounting Office (GAO) earlier (1978) identified 11 (as compared to 18 in this study) specific metric activities that appear to be useful in preparing for conversion.<sup>3</sup> Extent of involvement increased in four of the nine activities analyzed by both the GAO and this study. Conversely, implementation of the remaining five activities either decreased (three) or remained constant (two).

Companies that sell metric products also appear to have low involvement in the metric coordinating and planning activities. A small number of metricating companies either have no plans for conducting any metric related activities (17%) or have activities planned but not in progress (6%). Most of the non-metricating companies have no plans (60%) or some planning (19%). It is possible that planning and coordination are not perceived to be necessary for metric conversion, particularly since soft metric conversion is the mode.

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<sup>3</sup> Comptroller General, *Getting a Better Understanding of the Metric System - Implications if Adopted by the United States*, U.S. General Accounting Office, Washington, D.C., October 1978, Report number CED-78-128.

### *What About New Products, New Equipment?*

About 34 percent of new products are using metric designs, of which about 16 percent are soft metric, 13 percent are hard, and the remainder hybrid.

Also, overall estimates suggest that equipment and facilities with metric production capability are planned for future acquisition. (See Figure 4.)

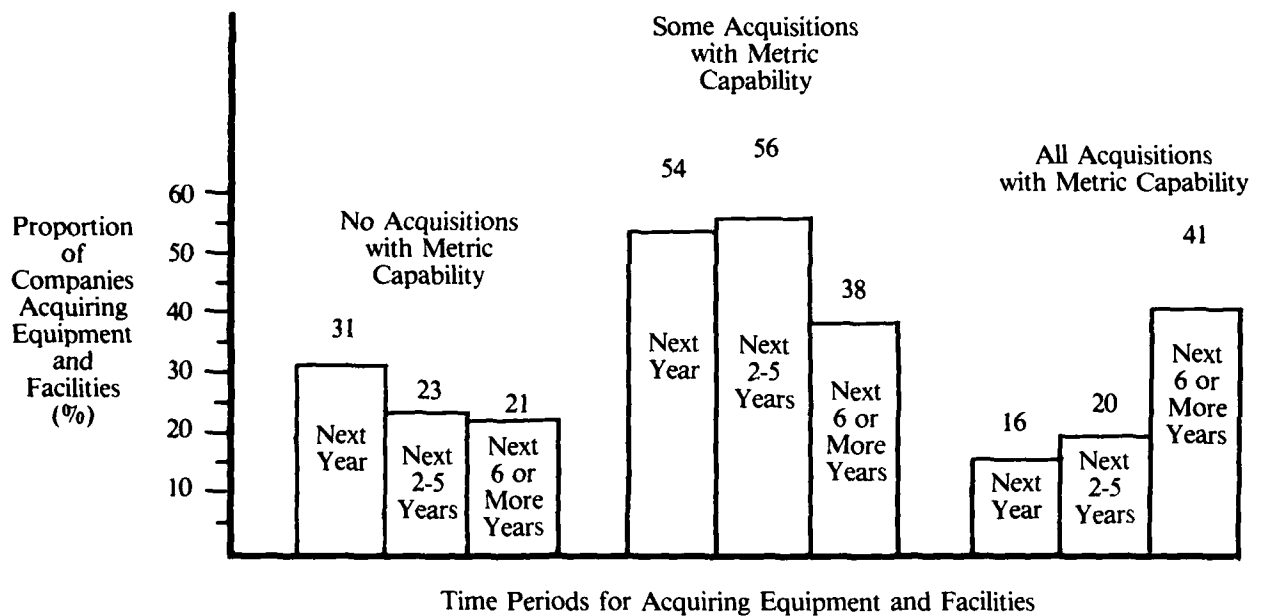


Figure 4. When Companies Plan to Acquire Equipment and Facilities

The data suggest that acquisitions of equipment and facilities with metric capability will increase over time. Over 50 percent of the firms plan on adding some metric capability within the next five years. Beyond 1985, all new equipment and facilities acquired by about 41 percent of the firms are expected to have metric production capability.

### *Laws and Government Regulations Are Seen As Impediments to Metrication*

About a third of the firms perceive laws and regulations as inhibiting voluntary conversion to the metric system. When compared with the GAO data, the perceptions of legal impediments to metrication has, at least for the Fortune 500, increased somewhat in the past few years. Likewise, coordination with government bodies about metrication has increased in the same period. These two trends suggest that perceptions of legal impediments may be directly related to government coordination; i.e., increased coordination may create or influence increased perceptions of legal impediments.

It is worth noting that previous work of the U.S. Metric Board is supported by the observations of the present study. The Board found that an "analysis of the nature of measurement units as they are imbedded in laws and regulations indicates that generally legal barriers ... do not exist. However, there are many cases where measurement units imbedded in laws and regulations appear, superficially, to present legal barriers to the use of metric units or to the introduction of metric sizes."<sup>6</sup> This study confirms that perception of the existence of barriers.

### *Reasons to Metricate*

There are a variety of reasons companies decide to begin metric conversion. Many of these are reflected by the large proportion of metric foreign sales. Companies who export, convert products to meet international standards and the demands of foreign customers. Domestically, some industry wide groups, such as health related industries, traditionally use metric measurements, or are becoming metricated via industry standards or coordination. For instance, one executive said his company has converted as part of an industry effort coordinated by a trade institute. Another simply gave "industry practice" as the reason for metrication. Other companies find the metric system to be more efficient. "We acknowledge the simplicity of metric dimensioning" said one official, "and believe it will ultimately reduce engineering and manufacturing errors and design time."

Finally, some firms are looking to the future. Specifically, an executive whose company uses dual labeling stated, "soft metrication can be beneficial as a first step in familiarizing our operators with the metric system." One company "anticipates future requirements of customers in the U.S."

<sup>6</sup> U.S. Metric Board, Providing a Metric Option. Can Laws and Regulations Be Amended in a Timely Manner?, Report to the President and the Congress of the United States, December 1979, Arlington, VA; and Middlesex Research Center, A Study of Metric Measurement and Legislation, September 1979, Contract A0-A06-78-00-1347, Washington, D.C.

### ***Factors Inhibiting Metrication***

Nearly nine of ten firms refer to at least one inhibiting factor. Customers not making the demand is the most important factor (about 51 percent of the firms cite it). One executive stated that his firm is waiting because "our customers show no desire for a metric product." Industry-wide standards was the next most important factor, cited by almost 30 percent. A respondent indicated that "until changes are made in our industry and with others we work with, a change is not feasible." In short, the general feeling seems to be expressed by a representative of a leading firm who said: "We will go metric when everyone else does."

Metrication is perceived by many as a costly and time consuming venture because employees are not now trained to use the metric system, equipment will have to be replaced, and numerous other operational concerns are involved.

Although much of the metrication occurring now is in an effort to compete on foreign markets or in response to customer demand, coordination on metric matters between customers and suppliers, at both the individual firm and industry-wide levels, appears limited. For example, most of the firms seeing customer demand as an inhibiting factor have not queried customers to determine their interests. Alternatively, most of those who have surveyed their customers report customer concern as an inhibiting factor. Similarly, about half of the companies querying suppliers report suppliers as an obstacle to metrication. (It is not possible to state whether perceptions of inhibiting factors preceded or followed customer and supplier surveys.)

Much of the domestic metric activity seems to be in response to customer demand or industry-wide practice. The matter of coordination at these levels may play a major role in the future of metrication, not only in terms of the practice itself, but the pace at which it will occur.

### ***When Might Metric Conversion Take Place?***

Ten years is the estimated median time frame for conversion under current voluntary conditions. Many firms feel that this period could be shortened to about three years if considerable pressure were to be applied by customers, suppliers, or industry groups, although metrication within eight years is the time period preferred by one-half of the companies. Some companies say that even under pressure they will never become metric, suggesting that metrication may never fully reach across all industries.

### ***In Conclusion***

Metrication is taking place in industry and indications are that there will be a gradual increase of the production of metric goods over time. More new products are being designed in metric units and more equipment and facilities capable of metric production are expected to be acquired. These changes seem to be occurring concurrently with little pressure from suppliers and customers, a lack of industry-wide standards, and concerns for legal and other impediments. All things considered, it seems that 10 years will see a notable increase in metricated companies. The apparent limited planning and coordination activities for the increasing use of the metric system is perplexing and, if true may result in increased costs, disruption, inefficiencies, and other manifestations of disutility.

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